

REMARKS/ARGUMENTS

Claim 1 has been amended. Claims 2-11 remain in this application. No new matter has been added.

Reconsideration of the rejection of Claims 1-11 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention, is requested, in light of the following arguments.

Claims 1 has been amended in response to the Examiner's kind suggestions, no new matter has been entered.

Briefly, applicants wish to point out the major features of their claimed invention which is a novel method and apparatus for simultaneously polishing a plurality of substrates while conditioning the polishing medium on the surface of a polishing pad. A plurality of coaxial polishing-dressing head devices, each holding a substrate to be polished, rotating along its central axis while pressing the rotating substrates, each within a radial segment of the rotating polishing pad. A polishing pad dressing ring is mounted coaxially encircling each of the substrate supporting heads. The applied compression on the substrate supporting heads pushes the substrate and the coaxially mounted dressing ring against the upper surface of the polishing pad, hence, polishing each substrate while dressing the polishing pad.

Reconsideration of the rejection of Claims 1-4 and 8-11 under 35 U.S.C., 103(a), as being unpatentable over Hempel, Jr. (USP 5,895,270 in view of Aiyer (USP

6,302,770), is requested, in light of the following arguments.

As noted by the Examiner, Hempel, Jr. fails to teach a coaxial polishing dressing head assembly as described in the claimed invention. There are other major differences as well. Hempel, Jr. teaches two CMP embodiments, each having multiple polishing and buffing stations. A first embodiment using a vertical processing arrangement and a second using a horizontal processing arrangement, and each having too many degrees of motion while also generating more heat during polishing because of a smaller diameter polishing platen.

While Aiyer teaches an in-situ pad conditioner it appears the carrier insert extends and retracts as the wafer carrier is lowered and raised to permit the pad conditioner surface to operate. The movement of the carrier insert is analogous to a piston in an air cylinder having fundamental stiction and friction properties. The carrier insert adjusts to the action of the wafer carrier. The pressure on the wafer would be influenced by the "air spring", hence, detracting from its polishing performance.

This contrasts with the claimed invention in which a coaxial polishing-dressing apparatus as claimed in amended Claim 1, lines 5-18, which includes a plurality of coaxial polishing-dressing head assemblies each having a lower nesting surface opposed to an upper surface of the polishing pad on said polishing platen, a nesting means releasably holding a substrate to be polished, said coaxial assembly means rotating along a central axis thereof and pressing the substrates on a radial portion of said rotating polishing pad; annular dressing rings for dressing said polishing pad are positioned

coaxially encircling each nested substrate, said annular dressing rings are removably attached to said lower surface of a plurality of substrate nesting support heads, and compressing means for applying a polishing and dressing pressure to said coaxial polishing-dressing head assemblies, whereby the substrate polishing-dressing head assemblies are pressed against the upper surface of the polishing pad.

The annular dressing rings of claim 1, and the manner in its application as illustrated in Figs. 4, 5 and 6, are neither taught nor suggested by the prior art.

Reconsideration of the rejection of Claims 5 and 7 under 35 U.S.C., 103(a), as being unpatentable over Hempel, Jr. (USP 5,895,270 in view of Aiyer (USP 6,302,770), in further view of Shimizu et al. (USP6,176,762) is requested, in light of the following arguments.

The arguments of Hempel, Jr., Aiyer were presented above. As noted by the Examiner, neither teaches a dresser ring comprising ceramic Shimizu et al., are directed towards the cutting of a ceramic base plate. This is not even remotely related to conditioning of a polishing pad during CMP. Shimizu et al. bonds a ceramic base plate to one end of a supporting plate while dressing the supporting plate and the ceramic base plate will be cut while, at the same time, cutting the supporting plate to a certain depth. This process describes a machining technique analogous to one being practiced in a machine shop.

This contrasts with the claimed invention in which a coaxial polishing-dressing apparatus as claimed in amended Claim 1, lines 5-18, which includes a plurality of

coaxial polishing-dressing head assemblies each having a lower nesting surface opposed to an upper surface of the polishing pad on said polishing platen, a nesting means releasably holding a substrate to be polished, said coaxial assembly means rotating along a central axis thereof and pressing the substrates on a radial portion of said rotating polishing pad; annular dressing rings for dressing said polishing pad are positioned coaxially encircling each nested substrate, said annular dressing rings are removably attached to said lower surface of a plurality of substrate nesting support heads, and compressing means for applying a polishing and dressing pressure to said coaxial polishing-dressing head assemblies, whereby the substrate polishing-dressing head assemblies are pressed against the upper surface of the polishing pad.

The annular dressing rings of claim 1, and the manner in its application as illustrated in Figs. 4, 5 and 6, are neither taught nor suggested by the prior art.

Reconsideration of the rejection of Claim 6 under 35 U.S.C., 103(a), as being unpatentable over Hempel, Jr. (USP 5,895,270 in view of Aiyer (USP 6,302,770), in further view of Shimizu et al. (USP6,176,762), as evidenced by Erickson (USP 6,080,216) is requested, in light of the following arguments.

The arguments of Hempel, Jr., Aiyer and Shimizu were presented above. As noted by the Examiner, neither teaches a glass frit binder. The use of inclusions of a glass frit binder in a ceramic substrate to construct an annular dressing ring is an engineering application taught in materials science courses.

This contrasts with the claimed invention in which a coaxial polishing-dressing

apparatus as claimed in amended Claim 1, lines 5-18, which includes a plurality of coaxial polishing-dressing head assemblies each having a lower nesting surface opposed to an upper surface of the polishing pad on said polishing platen, a nesting means releasably holding a substrate to be polished, said coaxial assembly means rotating along a central axis thereof and pressing the substrates on a radial portion of said rotating polishing pad; annular dressing rings for dressing said polishing pad are positioned coaxially encircling each nested substrate, said annular dressing rings are removably attached to said lower surface of a plurality of substrate nesting support heads, and compressing means for applying a polishing and dressing pressure to said coaxial polishing-dressing head assemblies, whereby the substrate polishing-dressing head assemblies are pressed against the upper surface of the polishing pad.

The annular dressing rings of claim 1, and the manner in its application as illustrated in Figs. 4, 5 and 6, are neither taught nor suggested by the prior art.

Furthermore, it is respectfully suggested that the combination of these references cannot be made without reference to Applicant's own invention. None of the applied references address the problem of increasing machine throughput by consolidating substrate polishing with pad dressing while doing it to a plurality of substrates. Applicant has claimed his process in detail. The processes of Figs. 3-6 (Claims 12-21) are both believed to be novel and patentable over there various references, because there is not sufficient basis for concluding that the combination of claimed elements would have been obvious to one skilled in the art. That is to say, there must be something in the prior art or line of reasoning to suggest that the combination of these various references is desirable. We therefore request Examiner MacArthur to reconsider her rejection in view

of these arguments and the amendments to the Claims.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned.

“Version with markings to show changes made.”

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE**In the Claims:**

Please amend claim1 as follows:

- 1.(AMENDED) A coaxial polishing-dressing apparatus comprising:
a polishing platen having an upper surface on which a polishing pad is
affixed, said polishing platen being rotated in one direction along a
central axis thereof;
- 5 a plurality of coaxial polishing-dressing head assemblies each having a
lower nesting surface opposed to an upper surface of the polishing pad
on said polishing platen, [said] a nesting means releasably holding a
substrate to be polished, said coaxial assembly means rotating along a
central axis thereof and pressing the substrates on a radial portion of said
10 rotating polishing pad;
- annular dressing rings for dressing said polishing pad are positioned
coaxially encircling each nested substrate, said annular dressing
rings are removably attached to said lower surface of [said] a plurality of
substrate nesting support heads; and
- 15 compressing means for applying a polishing and dressing pressure to said
coaxial polishing-dressing head assemblies, whereby the substrate
polishing-dressing head assemblies are pressed against the upper surface
of the polishing pad.